

1. A nitride semiconductor light emitting device which comprises at least a substrate, an n-type contact layer for forming an n-electrode, an active layer where electrons and holes are recombined and a p-type contact layer for forming a p-electrode, each layer being made of nitride semiconductor, wherein said n-type contact layer comprises a nitride semiconductor doped with an n-type impurity and has a first surface and a second surface, on which a first and a second undoped nitride semiconductors are formed respectively to make a three-layer laminated structure.
2. The nitride semiconductor light emitting device according to claim 1, wherein said n-type contact layer is GaN doped with Si as an n-type impurity, and said first nitride semiconductor joined to the first surface of said n-type contact layer is undoped GaN or AlGaN while said second nitride semiconductor joined to the second surface of said n-type contact layer is one of undoped GaN, AlGaN and InGaN.
3. The nitride semiconductor light emitting device according to claim 2, wherein said n-type contact layer has a carrier concentration of $3 \times 10^{18}/\text{cm}^3$ or more.
4. The nitride semiconductor light emitting device according to claim 2, wherein said n-type contact layer has a resistivity of $8 \times 10^{-3} \Omega \text{cm}$ or less.
5. The nitride semiconductor light emitting device according to claim 3, wherein said n-type contact layer has a resistivity of $8 \times 10^{-3} \Omega \text{cm}$ or less.
6. The nitride semiconductor light emitting device according to claim 1, wherein said n-type contact layer of the three-layer structure is formed on a buffer layer formed on a sapphire substrate.

1 7. A nitride semiconductor light emitting device which comprises at least a substrate, an n-
2 type contact layer for forming an n-electrode, an active layer where electrons and holes
3 are recombined and a p-type contact layer for forming a p-electrode, each layer being
4 made of nitride semiconductor, wherein said n-type contact layer comprises a super-
5 lattice layer which comprises a laminate layer of at least a nitride semiconductor layer
6 doped with an n-type impurity and a nitride semiconductor undoped with an n-type
7 impurity.

1 8. The nitride semiconductor light emitting device according to claim 7 wherein said n-type
2 contact layer comprises super-lattice layer of combination of nitride layers selected from
3 the group consisting of GaN/GaN, InGaN/GaN, AlGaN/GaN and InGaN/AlGaN, at least
4 either one of which is doped with Si.

5 9. The nitride semiconductor light emitting device according to claim 8, wherein said n-type
6 contact layer has a carrier concentration of $3 \times 10^{18}/\text{cm}^3$ or more.

7 10. The nitride semiconductor light emitting a device according to claim 8, wherein said n-
8 type contact layer has a resistivity of $8 \times 10^{-3} \Omega \text{cm}$ or less.

9 11. The nitride semiconductor light emitting a device according to claim 9, wherein said n-
10 type contact layer has a resistivity of $8 \times 10^{-3} \Omega \text{cm}$ or less.

1 12. The nitride semiconductor emitting device according to claim 7, wherein said n-type
2 contact layer comprises a nitride semiconductor super-lattice doped with an n-type
3 impurity and has a first surface and a second surface, on which a first and a second layer
4 of undoped nitride semiconductor or nitride semiconductor doped with a n-type impurity
5 less than that of said super super-lattice are formed respectively to make a three-layer

1 laminated structure.

1 13. The nitride semiconductor emitting device according to claim 8, wherein said n-type
2 contact layer is formed on an undoped GaN layer formed on a buffer layer which is
3 formed on a sapphire substrate, further nitride semiconductor layer comprising said active
4 layer is formed through GaN undoped with n-impurity on said n-type contact layer.

1 14. A nitride semiconductor light emitting device which comprises at least a substrate, an n-
2 type contact layer for forming an n-electrode, an active layer here electrons and holes are
3 recombined and a p-type contact layer for forming a p-electrode, each layer being made of
4 nitride semiconductor, wherein said n-type contact layer of GaN comprises a nitride
5 semiconductor doped with Si as an n-type impurity and has first surface and a second
6 surface, on which a first and a second nitride semiconductors are formed respectively, at
7 least one of the first and second nitride semiconductors is doped with Si in an amount of
8 less than that of said n-type contact layer, and wherein said first nitride semiconductor
9 joined to the first surface of said contact layer is of GaN or AlGaIn while the second
10 nitride semiconductor joined to the second surface of said contact layer is of GaN, AlGaIn
11 or InGaIn.

1 15. A semiconductor device comprising:

- 2 a. a substrate;
- 3 b. a substantially undoped gallium nitride layer formed over the substrate;
- 4 c. a doped gallium nitride layer formed on the substantially undoped gallium nitride
5 layer; and
- 6 d. a layer of a gallium nitride semiconductor formed on the doped gallium nitride
7 layer having a doping concentration lower than that of the doped gallium nitride
8 layer.

1 16. The semiconductor device according to claim 15 further comprising a gallium nitride
2 buffer layer formed between the substrate and the substantially undoped gallium nitride
3 layer.

1 17. The semiconductor device according to claim 15 wherein the layer of a gallium nitride
2 semiconductor formed on the doped gallium nitride layer is substantially undoped.

add
'B'